(11)

EP 0 999 364 A3

(12)

EUROPEAN PATENT APPLICATION

- (88) Date of publication A3: 14.02.2001 Bulletin 2001/07
- (51) Int. Cl. 1:

F04B 27/10, F16J 15/32

- (43) Date of publication A2: 10.05.2000 Bulletin 2000/19
- (21) Application number: 99121751.4
- (22) Date of filing: 03.11.1999
- (84) Designated Contracting States:

 AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU

 MC NL PT SE

 Designated Extension States:

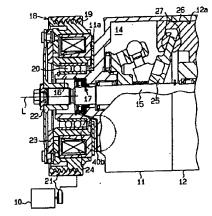
 AL LT LV MK RO SI
- (30) Priority: 04.11.1998 JP 31350598
- (71) Applicant: Kabushiki Kaisha Toyoda Jidoshokki Selsakusho Aichi-ken (JP)
- (72) Inventors:
 - , Sugiura, Manabu, c/o K.K. Toyoda Jidoshokki Kariya-shi, Aichi-ken (JP) , Kondo, Yoshitami, c/o K.K. Toyoda Jidoshokki Kariya-shi, Aichi-ken (JP)
- (74) Representative:

Leson, Thomas Johannes Alois, Dipl.-Ing. et al Patentanwälte Tiedtke-Bühling-Kinne & Partner, Bavariaring 4 80336 München (DE)

(54) A shaft seal assembly including a drain passage

(57)An oil sealing structure having a draining passage (39) for draining oil from a seal assembly (17) The seal assembly (17) is located between a housing (11), and a drive shaft (15). A first seal member (31) contacts the inner wall of the housing (11). A second seal member (33) contacts the drive shaft (15). An oil barrier (37) is located frontward of the first and second seal members (31, 33). The oil barrier (37) extends toward the drive shaft (15). A plurality of drain passages (39) connect the inner side and the outer side of the seal assembly (17) between the oil barrier (37) and the second seal member (33). Oil that leaks past the second seal member is stopped by the oil barrier (37) and is drained to a location outside the seal assembly (17).

Flg.1



364 A

666

EP 0



ç

EUROPEAN SEARCH REPORT

Application Number EP 99 12 1751

Category	Citation of document with	ndication, where appropriate,	Relevant	CLASSIFICATION OF THE
Calegory	of relevant pas	sages	to claim	APPLICATION (Int.CI.7)
X	;KIMURA KAZUYA (JP) 9 July 1998 (1998-0	(ABUSHIKI KAISHA TOYODA SHO) 1998-12-30)	1,2,7-9	F04B27/10 F16J15/32
A	,		3	
X	FR 2 047 297 A (SPE 12 March 1971 (1971 * page 2, line 27-3 * page 3, line 4-27 * figures 1,2 *	85 *	1,2,7,8	
A	3 -,-		4,5	
x	FR 2 408 081 A (PAL 1 June 1979 (1979-0 * page 6, line 4-7	06-01)	1,6	
A	* figures 1,2 *	•	5,8	TECHNICAL FIELDS SEARCHED (Int.CL7)
X	WO 92 12366 A (BW I 23 July 1992 (1992- * page 3, line 19 - * figure *		1,7,8	F16J F04B
A	119210		2	
P,X	DE 298 07 796 U (GH SCHRAUBENKOMPRESSOR 9 September 1999 (1 * page 2, line 26 - * figure 1 *	EN) 999-09-09)	1,2,7,8	
	The present search report has	been drawn up for all claims		
	Place of search	Date of completion of the search	<u>- </u>	Examiner
	THE HAGUE	22 December 2000	Van	Wel, 0
X : parti Y : parti docu	ATEGORY OF CITED DOCUMENTS cutarly relevant if taken alone cutarly relevant if combined with anot ment of the same category tological background	E : earlier patent doc after the filing da	cument, but publis le in the application or other reasons	shed on, or

FDO FORM 1803



?

EUROPEAN SEARCH REPORT

Application Number EP 99 12 1751

ategory	Citation of document with in of relevant pass.	dication, where appropriate, ages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
	EP 0 851 159 A (TOY) WORKS) 1 July 1998 * column 8, line 33 * figure 6 *	(1998-07-01)	2-4,7	
				TECHNICAL FIELDS SEARCHED (Int.Cl.7)
	The present search report has b	een drawn up for all claims		
	Place of search THE HAGUE	Date of completion of the search 22 December 200	00 Van	Examiner Wel, O
X : parti Y : parti docu A : tech	ATEGORY OF CITED DOCUMENTS icularly relevant if taken alone icularly relevant if taken alone cutarly relevant if combined with anothment of the same category notogical background written disclosure	T : theory or print E : earlier patent after the filing er D : document cite L : document cite	ciple underlying the in document, but publis date d in the application d for other reasons	wention thed on, or

EPO FORM 1603 03.82 (PO4C01)

EP 0 999 364 A3 ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 99 12 1751

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-12-2000

atent document d in search repo		Publication date		Patent family member(s)	Publication date
9829660	A	09-07-1998	JP	9170553 A	30-06-19
			EP	0887550 A	30-12-19
			US	6112639 A	05-09-20
2047297	A	12-03-1971	AT	291777 R	15-06-19
			DE	2021775 A	12-11-19
2408081	Α	01-06-1979	DE	2847279 A	03-05-19
					16-03-19
			FR	2430554 A	01-02-19
9212366	A	23-07-1992	NONE		
29807796	U	09-09-1999		9957440 A	11-11-19
			EP	0993553 A	19-04-20
0851159	Α	01-07-1998	US	6123514 A	26-09-20
			WO	9802681 A	22-01-19
	9829660 2047297 2408081 9212366 29807796	2047297 A 2408081 A 9212366 A 29807796 U	9829660 A 09-07-1998 2047297 A 12-03-1971 2408081 A 01-06-1979 2212366 A 23-07-1992 29807796 U 09-09-1999	9829660 A 09-07-1998 JP EP US 2047297 A 12-03-1971 AT DE 2408081 A 01-06-1979 DE ES FR 2212366 A 23-07-1992 NONE 29807796 U 09-09-1999 WO EP	9829660 A 09-07-1998 JP 9170553 A EP 0887550 A US 6112639 A 2047297 A 12-03-1971 AT 291777 B DE 2021775 A 2408081 A 01-06-1979 DE 2847279 A ES 474743 A FR 2430554 A 9212366 A 23-07-1992 NONE 29807796 U 09-09-1999 WO 9957440 A EP 0993553 A 0851159 A 01-07-1998 US 6123514 A

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82